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ABSTRACT

This paper presents a study focusing on the use of class time by minority students in junior high school science classrooms. An instrument was developed to assess classroom behaviors and the interactions of students, which was used to obtain information about classroom behaviors that might affect minority student outcomes in science. Students from a desegregated urban school district were observed by trained observers using the developed instrument to gather information about the interactions of subject students (N=52) with target students (several hundred) and six teachers at four different junior high schools. Results indicate: (1) that the instrument could be successfully used to record students' behaviors and interactions; (2) that very few cross-race interactions occur, even in an activity-oriented classroom; (3) that the frequency of attending behaviors was greater than the frequency of non-attending behaviors for male students of both races; (4) that no significant differences exist between black male students and white male students in classroom behavior patterns; and (5) that the average final grade for black male students was lower than the average final grade for white male students. (CS)

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STUDENT BEHAVIORS IN DESEGREGATED JUNIOR HIGH SCHOOL SCIENCE CLASSROOMS

by

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of the National Association for Research in Science Teaching.
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In recent years a considerable amount of effort and funds have gone into developing new science curricula and into promoting school integration. Both of these developments were instituted for the purpose of improving education, and both have had somewhat disappointing results. Several aspects of these two developments were examined in this study. The focus was on student behaviors and interpersonal interactions in desegregated classrooms in which a form of the new curricula was used. Information about the frequencies of the behaviors and their relations to student outcomes was obtained.

Statement of Problem

The purpose of the present study was to obtain information that would add to our knowledge and increase our understanding of the nature and outcome of student behaviors in desegregated activity-centered science classrooms at the junior high school level. To accomplish this purpose an observational instrument was developed; data on student characteristics, frequencies of behaviors, and achievement were collected; and the data were analyzed and interpreted in the context of current theory and practice. The research questions were:

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1. What are the nature and extent of interpersonal interactions in desegregated activity-centered junior high school science classrooms?
2. How do students spend their time in desegregated activity-centered junior high school science classrooms?
3. How do classroom behaviors relate to classroom science achievement in desegregated activity-centered junior high school science classrooms?

Classrooms using the Intermediate Science Curriculum Study (ISCS) program materials were selected for observation.

Method

The study was in three phases: (a) development of an instrument and training of observers; (b) selection of classroom settings and subjects; and (c) focused observations. The study was designed to obtain maximum information about the interactions and other behaviors in the classrooms with minimum disruption to the usual classroom processes.

Sample

Fourteen junior high school science classes from an urban school district were selected for observation. These classes represented four schools and six teachers. Four male subjects, two black and two white, were randomly selected from each class. Of the 56 subjects selected, data on the frequencies of behaviors, California Achievement Tests, and classroom achievement of 52 subjects were analyzed. Four subjects were eliminated due to changes in class schedule or transfers to another school. In order to obtain information about the total population of the selected classrooms, data on California Achievement Tests and classroom achievement

were also collected on the other 245 students enrolled in the classes.

Instrument

A search was made of the literature for a suitable instrument for observing behaviors of students in desegregated activity-centered science classrooms (Simon and Boyer, 1974; Mayer, 1974; ERIC). When none was found that seemed adequate for obtaining the information desired, an instrument was designed using ideas from the literature and from some of the available systems (Perkins, 1964; Fischler and Zimmer, 1968; Smith, 1971; Power and Tisher, 1974; Roderick, 1975). The behavior categories were derived from Rationale for ISCS (1971), Rationale for Individualization (1972), Your Students' Role (1973), a review of the literature on ISCS (1970-79), ISCS textbooks, and informal observations in ISCS classrooms. A low-inference, on-site observational instrument with an inclusive small number of meaningful student behaviors was the result. The student behaviors were broadly classified into on-task and off-task categories. Each of these categories was subdivided as follows:

1. On-Task Behaviors
   - a. experimenting
   - b. reading/writing
   - c. listening
   - d. discussing
   - e. test-taking

2. Off-Task Behaviors
   - a. waiting
   - b. socializing
     - 1) positive
     - 2) negative
   - c. detached

Procedures

Undergraduate students were trained to use the developed instrument. The percentage of inter-rater agreement was obtained on several occasions and ranged from 77% to 95%. This was comparable to agreement levels reported for other observational instruments. Correlation coefficients

between the first set of five observations and the second set of five observations were computed in order to determine the stability of the behavior categories over time. The correlation coefficient for on-task behaviors was .65; it was .58 for off-task behaviors.

The trained observers coded and recorded the classroom behaviors of one subject at a time in selected classrooms. They recorded, during the recording interval, all of the behaviors that were exhibited by a subject during the observation intervals. Behaviors were observed and recorded by 5-second intervals for six minutes on 10 different occasions for each subject. The observers listened to taped instructions indicating the beginning and ending of the 5-second observation interval followed by instructions indicating the beginning and ending of the 5-second recording interval. A total of 25 minutes of recorded observed behaviors was analyzed for each subject.

Results

The data derived from the observations were summarized for each subject. In addition, the age, California Achievement Test (CAT) numerical and reading scores, class achievement scores, and number of days absent from school during the observation period were obtained. These data made up the raw data set and were the data used in all of the analyses.

To answer the first question, the frequencies of interactions and the percentages of the total frequency of each interaction were calculated for both black and white subjects separately. It was found that friendly socializing was the most frequent subject-student interaction, task-related discussing was the most frequent subject-teacher interaction, and the frequencies of cross-race interactions were much smaller than the frequencies of within-race interactions. In terms of unfriendly interactions,

both the frequencies of subject-student and subject-teacher interactions were very low. Furthermore, when the frequencies of the individual interactions of the black subjects were compared with those of the white subjects, no significant differences were found.

To answer the second question, regarding how students spend their class time, the frequencies of each behavior were computed, and Wilcoxon two-sample tests were performed. The results indicated that the most frequent behavior was an on-task behavior (reading/writing) and the next two most frequent were off-task behaviors (socializing and detached). Other results found no significant differences between the black and white subjects in the frequencies of any of the on-task or off-task behaviors.

The third question about the relationship of classroom behaviors to achievement was answered by subjecting the data to correlation computations, one-way analyses of variance, analyses of co-variance using the CAT scores as covariants, and regression analyses. High positive correlations ($p \leq .01$) were found between the CAT scores and final grade for both the black and white subjects. When the two groups were compared in terms of the mean CAT and final grade scores, significant differences in all measures were found; however, the analyses of covariance indicated that after adjusting the final grade averages for initial differences in the students' reading and numerical levels, no significant differences in final grade scores were found.

For black subjects, a low positive correlation between final grade and experimenting, a moderate negative correlation between detached and CAT scores, and a high negative correlation between detached and final grade were found; however, no significant correlations were found between any of the measures and frequencies of behaviors for white subjects.

The regression analyses indicated that CAT numerical scores were the best single predictor of final grade for both groups of subjects, even though the amount of prediction was not the same. After the best one-predictor model, the order and amount of variance accounted for in final grade by the predictor variables differed. Furthermore, experimenting and the model of off-task behaviors were significant in predicting the final grades for black subjects, but not for white subjects.

Discussion and Conclusions

The purpose of this investigation was to seek information about what was going on in the desegregated activity-centered junior high school science classrooms. The analyses of the data obtained through systematic observations in these classrooms and from school records indicated that: (a) the developed instrument was suitable and reliable for observing student behaviors and interactions in desegregated activity-centered junior high school science classrooms; (b) the frequencies of cross-race interactions were small, indicating that the classroom still may not be integrated; (c) the frequency of on-task behaviors was greater than the frequency of off-task behaviors for both black and white subjects; (d) there were no significant differences between the black and white subjects in the frequencies of the behaviors, but the frequencies of the behaviors accounted for different amounts of variance in the final grades of the two groups of subjects; (e) CAT numerical scores accounted for a large percentage of the variance in the final grade for both groups; and (f) certain behaviors were significant in predicting final grades for black subjects, but not for white subjects.

Within the limits of this investigation, it appears that (a) the

classrooms were desegregated but not integrated; (b) students were performing on-task behaviors more frequently than off-task behaviors; and (c) the relationship between frequencies of behaviors and final grade were not the same for both groups of subjects, even though there were no significant differences between the two groups in the frequencies of of any of the on-task behaviors, off-task behaviors or interactions. This information about "what is going on" in desegregated activity-centered junior high school science classrooms should be of value to junior high school science teachers and other science educators. Furthermore, the information should open avenues for studying the use of class time, interactions that occur in the classroom, relationships between frequencies of behaviors and achievement, and similarities and differences between the behaviors of black and white students in activity-centered junior high school science classrooms.

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